wwPDB X-ray Structure Validation Summary Report (i)

May 26, 2020 – 12:30 pm BST

PDB ID	:	1CQZ
Title	:	CRYSTAL STRUCTURE OF MURINE SOLUBLE EPOXIDE HYDROLASE.
Authors	:	Argiriadi, M.A.; Morisseau, C.; Hammock, B.D.; Christianson, D.W.
Deposited on	:	1999-08-12
Resolution	:	2.80 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

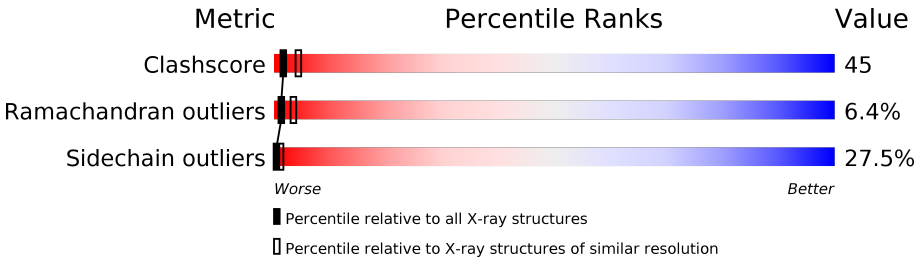
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	554	30% 41% 15% • 12%
1	B	554	32% 44% 20% ••

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 8218 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called EPOXIDE HYDROLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	487	Total	C	N	O	S	61	0	0
			3879	2501	648	701	29			
1	B	541	Total	C	N	O	S	71	0	0
			4299	2766	719	783	31			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	18	Total	O	0	0
			18	18		
2	B	22	Total	O	0	0
			22	22		

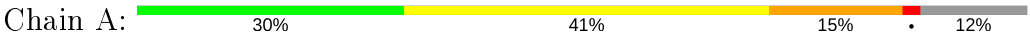
3 Residue-property plots (i)

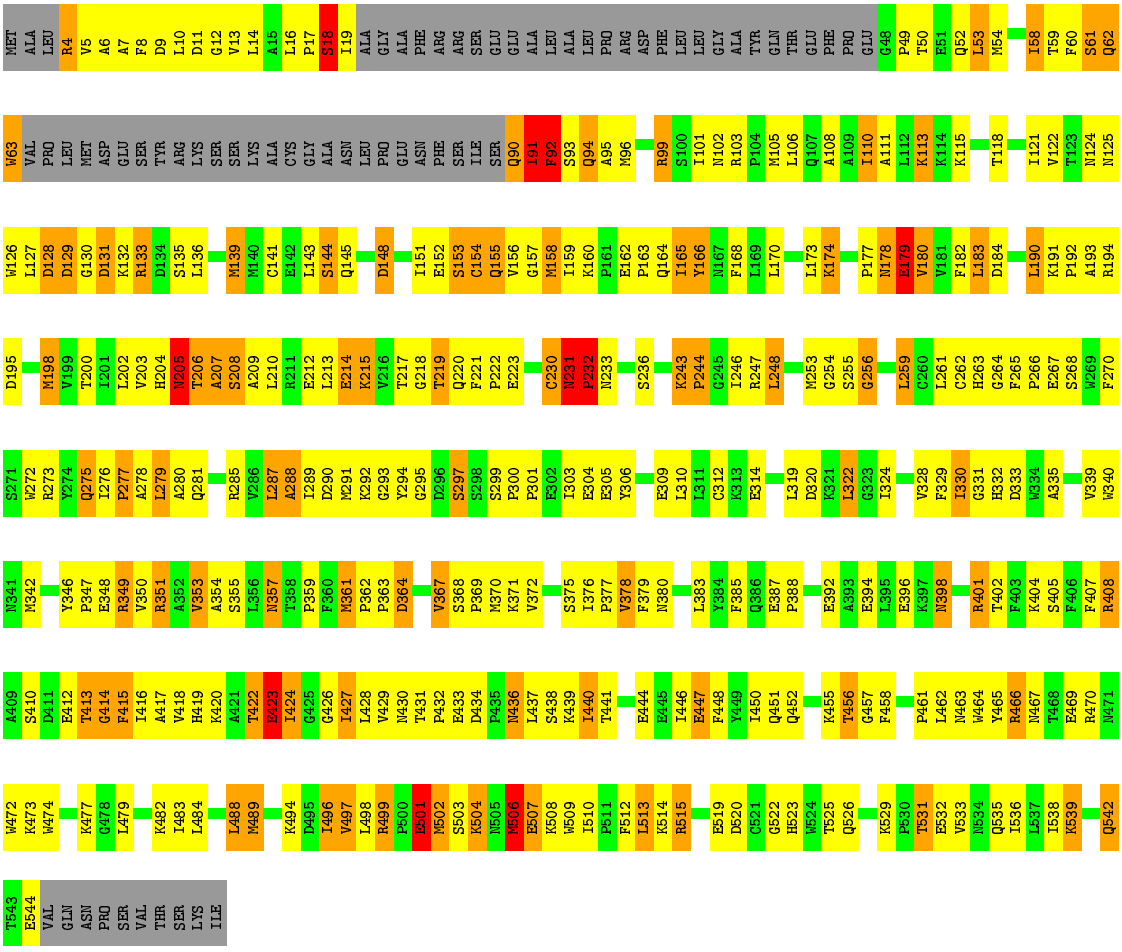
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

- Molecule 1: EPOXIDE HYDROLASE

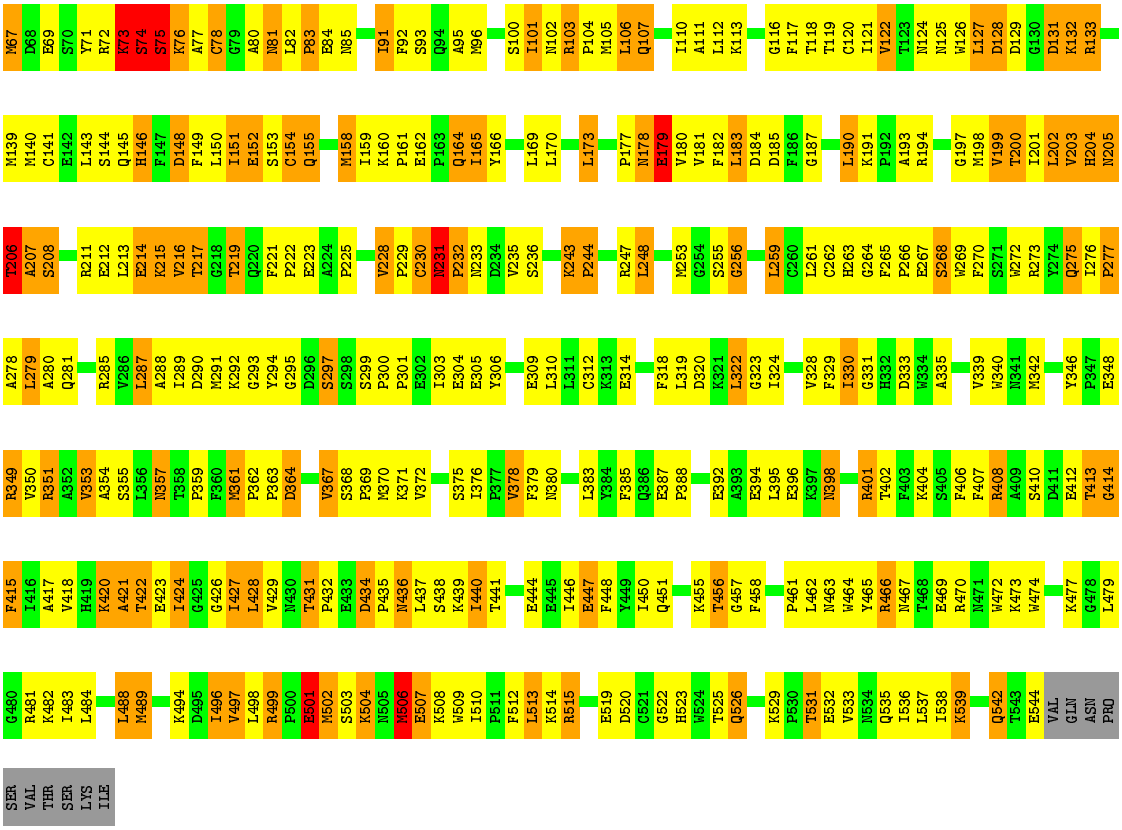
Chain A:





- Molecule 1: EPOXIDE HYDROLASE

Chain B:


M67 D68 E69 S70 V71 R72 K73 S74 S75 K76 A77 C78 G79 A80 N81 L82 P83 E84 N85 I91 F92 S93 Q94 A95 M96 S100 I101 N102 R103 P104 M105 L106 Q107 I110 A111 L112 K113 G116 F117 T118 T119 C120 I121 V122 T123 N124 N125 W126 L127 D128 D129 G130 D131 K132 R133
M139 M140 C141 E142 L143 S144 Q145 H146 F147 D148 F149 L150 I151 E152 S153 C154 Q155 M158 I159 K160 P161 E162 P163 Q164 I165 Y166 L169 L170 L173 P177 N178 E179 V180 V181 F182 L183 D184 D185 F186 G187 L190 K191 P192 A193 R194 G197 M198 V199 T200 I201 L202 V203 H204 N205
T206 A207 S208 R211 E212 L213 E214 K215 V216 T217 G218 T219 Q220 F221 P222 E223 A224 P225 V228 P229 C230 N231 P232 N233 D234 V235 S236 K243 P244 R247 L248 M253 G254 S255 G256 L259 C260 L261 C262 H263 G264 F265 P266 E267 S268 W269 F270 S271 W272 R273 Y274 Q275 I276 P277
A278 L279 A280 Q281 R285 V286 L287 A288 I289 D290 M291 K292 G293 Y294 G295 D296 S297 S298 S299 P300 P301 E302 I303 E304 E305 Y306 E309 L310 L311 C312 K313 E314 F318 L319 D320 K321 L322 G323 I324 V328 F329 I330 G331 H332 D333 W334 A335 V339 W340 N341 M342 Y346 P347 E348
R349 V350 R351 A352 V353 A354 S355 L356 N357 T358 P359 F360 M361 P362 P363 D364 V367 S368 P369 M370 K371 V372 S375 I376 P377 V378 F379 N380 L383 Y384 F385 Q386 E387 P388 E392 A393 E394 L395 E396 K397 N398 R401 T402 F403 K404 S405 F406 F407 R408 A409 S410 D411 E412 T413 G414
F415 I416 A417 V418 H419 K420 A421 T422 E423 I424 G425 G426 I427 L428 V429 N430 T431 P432 E433 D434 P435 N436 L437 S438 K439 I440 T441 E444 E445 I446 E447 F448 Y449 I450 Q451 K455 T456 G457 F458 P461 L462 N463 W464 Y465 R466 N467 T468 E469 R470 N471 W472 K473 W474 K477 G478 L479
G480 R481 K482 I483 L484 L488 M489 K494 D495 I496 V497 L498 R499 P500 E501 M502 S503 K504 N505 N506 E507 K508 W509 I510 P511 F512 L513 K514 R515 E519 D520 C521 G522 H523 W524 T525 Q526 K529 P530 T531 E532 V533 N534 Q535 I536 L537 I538 K539 Q542 T543 E544 VAL GLN ASN PRO
SER VAL THR SER LYS ILE

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	151.90Å 143.00Å 60.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.80	Depositor
% Data completeness (in resolution range)	94.6 (20.00-2.80)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.214 , 0.309	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8218	wwPDB-VP
Average B, all atoms (Å^2)	37.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.66	0/3981	0.87	6/5397 (0.1%)
1	B	0.68	0/4413	0.86	8/5984 (0.1%)
All	All	0.67	0/8394	0.87	14/11381 (0.1%)

There are no bond length outliers.

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	231	ASN	C-N-CD	-15.19	87.18	120.60
1	A	231	ASN	C-N-CA	8.88	159.29	122.00
1	B	231	ASN	C-N-CD	-8.27	102.40	120.60
1	B	231	ASN	N-CA-C	5.43	125.67	111.00
1	B	231	ASN	C-N-CA	5.36	144.53	122.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3879	0	3863	335	0
1	B	4299	0	4270	398	0
2	A	18	0	0	4	0
2	B	22	0	0	1	0
All	All	8218	0	8133	715	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 45.

The worst 5 of 715 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:122:VAL:HG12	1:B:151:ILE:HG13	1.26	1.17
1:A:348:GLU:HA	1:B:133:ARG:HG3	1.33	1.11
1:A:5:VAL:HG22	1:A:118:THR:HB	1.33	1.08
1:B:232:PRO:HD2	1:B:233:ASN:H	1.16	1.03
1:A:58:ILE:HG22	1:A:62:GLN:HG3	1.44	1.00

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	481/554 (87%)	390 (81%)	59 (12%)	32 (7%)	1	3
1	B	539/554 (97%)	438 (81%)	68 (13%)	33 (6%)	1	4
All	All	1020/1108 (92%)	828 (81%)	127 (12%)	65 (6%)	1	3

5 of 65 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	18	SER
1	A	208	SER
1	A	232	PRO
1	A	256	GLY
1	A	415	PHE

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	424/480 (88%)	308 (73%)	116 (27%)	0 1
1	B	468/480 (98%)	339 (72%)	129 (28%)	0 1
All	All	892/960 (93%)	647 (72%)	245 (28%)	0 1

5 of 245 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	525	THR
1	B	101	ILE
1	B	494	LYS
1	A	542	GLN
1	B	50	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	81	ASN
1	B	125	ASN
1	B	451	GLN
1	B	85	ASN
1	B	107	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.